Series EHG SL 10
Integrated Temperature Controller
User's Manual

The Series EHG SL 10 is a powerful instrument that integrates a temperature process controller, high-low temperature alert, and power switching with a safety high limit that meets UL® 1998 and CE 60730 requirements. The optional display and communications modules can be easily upgraded in the field to provide a digital display, adjustable control parameters, RS485 MODBUS communications and other interface features. The compact design, inherent reliability and integrated safety limit functions make this control a tremendous value. The control is designed for easy integration with Watlow heaters providing additional value to simplify the engineering and component count on new equipment. CE compliance and UL recognition will reduce time and costs necessary for global agency testing and validation for OEMs.

Features and Specifications

Standard Base Module

- 2, Type K Thermocouple Inputs: Process Temperature Controller and Safety Limit.
- Isolated Universal Power Supply: 100 to 240V~ (ac) 50/60Hz
- Ambient operating temperature range 0 to 70°C
- Process Temperature Output: 10 amp "No Arc" relay
- Safety Limit: 10 amp relay
- High-Low Temperature Alert: 2 amp, 30V≂ (ac/dc), Form A relay
- On-Off and PID temperature control algorithm. Upgraded via communications to PID algorithm (minimum cycle time 5 seconds).

Integrated Temperature Control

- Standard Molex Connectors
- Dimensions

configuration	width	depth	height
basic unit	88.8 mm (3.496 in)	40.2 mm (1.582 in)	55.8 mm (2.196 in)
with mounting bracket	88.8 mm (3.496 in)	48.4 mm (1.907 in)	55.8 mm (2.196 in)
with communicatons-display module & mounting bracket	88.8 mm (3.496 in)	63.6 mm (2.503)	55.8 mm (2.196 in)

- Agencies: UL®/C-UL Listed, CE, Semi S2

Optional Communications Module

- Field adjustable set point
- Access to PID parameters
- Modbus RTU Communications
- RS 485
- 3-character, 7-segment LED display
- User Interface Software

The Series EHG SL 10 User's Manual is copyrighted by Watlow Winona, Inc., © May 2006, with all rights reserved.

Patent Pending

Watlow Winona
1241 Bundy Boulevard
Winona, MN 55987
Phone: (507) 454-5300; Fax: (507) 452-4507
www.watlow.com

0600-0050-0000 Rev. C
May 2006

Navigating the Series EHG SL 10 with the Front Panel

The three-character display normally shows the process temperature. Press the Mode Key once to view the Set Point value. The right decimal point will illuminate when viewing the Set Point value. Press the Up-Arrow or Down-Arrow Key to change the Set Point. Press the Mode Key again to return to the process temperature display. Otherwise the display will automatically return to showing the process temperature after three seconds.

To view or change parameter values, hold down both the Up-Arrow and Down-Arrow Keys for five seconds. This will display the Set Point High Limit prompt. Press the Mode Key to view the other parameter prompts. Press the Up-Arrow or Down-Arrow Key once to view a parameter's value. Press the Up-Arrow or Down-Arrow Key to increase or decrease that value. Press the Mode Key to again display the prompt and again to display the next prompt. Press the Mode Key at the Display Build Number prompt to return to the process value display.

Display	Parameter Name & Description	Range	Default	Access
	Set Point Set the set point.	0°C (32°F) to Set Point High Limit	150°C (302°F)	read/write
SLA	**Set Point High Limit Alarm** Set the temperature at which the limit will turn off the heater.	0 to 220°C (32 to 428°F)	200°C (392°F)	read/write
HtA	**High Temperature Alert (Above Set Point)** Set the high temperature that will trigger an alert.	1 to 99°C (2 to 178°F)	20°C (36°F)	read/write
LtA	**Low Temperature Alert (Below Set Point)** Set the low temperature that will trigger an alert.	5 to 99°C (9 to 178°F)	20°C (36°F)	read/write
Cnt	**Control Mode Select** Select a control method.	onF on-off PId PID	onF on-off	read/write
HYS	**On-Off Hysteresis** Set the how far below the set point the temperature can drop before the heater turns on.	3 to 28°C (5 to 50°F)	3°C (6°F)	read/write
Pb	**Proportional Band** Set the proportional band.	0 to 68°C (0 to 122°F)	0°C or F	read/write
Int	**Integral** Set the integral value.	0 to 999	0	read/write
dEr	**Derivative** Set the derivative value.	0 to 999	0	read/write
Ct	**Cycle Time** Set the cycle time.	5 to 60	10	read/write
Abt	**Ambient Temperature** View the ambient temperature.			read only
Adr	**Modbus Device Address** View the controller release version.	1 to 247	1	read/write
bAU	**Modbus Baud Rate** Select the communication speed.	96 9,600 192 19,200 384 38,400	96 9,600	read/write
tU	**Temperature Units** Select the temperature scale.	F C	C	read/write
bru	**Base Release Version** View the controller's base release version.			read only
bPr	**Base Prototype Version** View the controller's base prototype version.			read only
bbu	**Base Build Number** View the controller's base build number.			read only
dru	**Display Release Version** View the interface's release version.			read only
dPr	**Display Prototype Version** View the interface's prototype version.			read only
dbu	**Display Build Number** View the interface's build number.			read only

Keys and Indicator Lights

Alarm (flashing red)
Indicates that the process temperature is higher than the Set Point High Limit Alarm value.
Alert (solid red)
Indicates that the process temperature is higher than the High Alert Set Point.
In range (solid yellow)
Indicates that the process temperature is between the High Alert Set Point and Low Alert Set Point values.
Output (green)
Indicates that the process temperature is below the set point and the output is on.

Up-Arrow Key
Increases the displayed value.

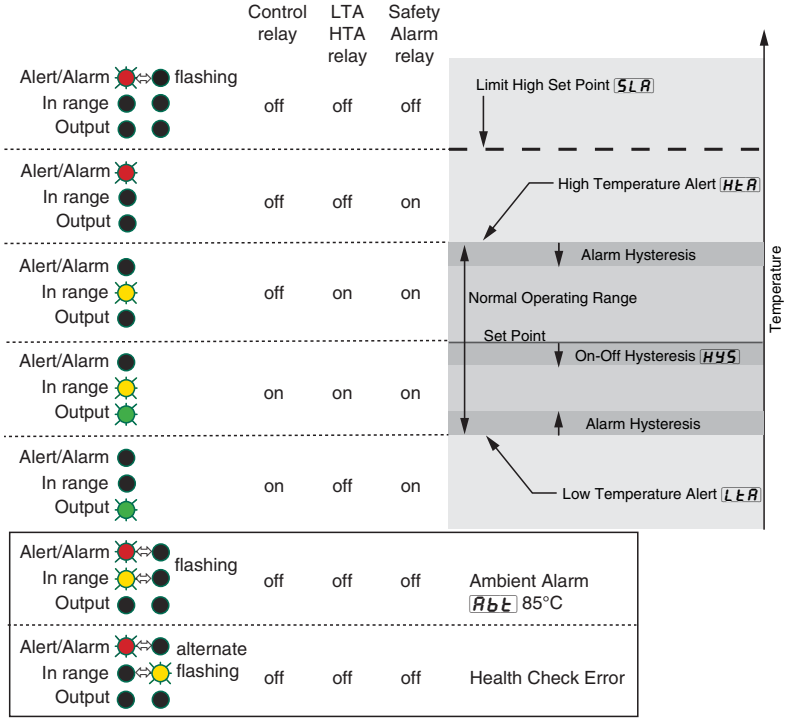
Down-Arrow Key
Decreases the displayed value.

Mode Key
Toggles the display between the set point and process temperature.

Flashing Alert/Alarm (red) and **In Range** (yellow)

If they are flashing together, that indicates an Ambient Alarm (controller temperature higher than 85°C).

If they are flashing alternately, that indicates a Health Check Error.



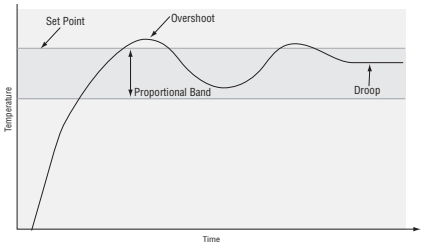
Proportional Control

Some processes need to maintain a temperature or process value closer to the set point than on-off control can provide. Proportional control provides closer control by adjusting the output when the temperature or process value is within a proportional band. When the value is in the band, the controller adjusts the output based on how close the process value is to the set point.

The closer the process value is to the set point, the lower the output power. This is similar to backing off on the gas pedal of a car as you approach a stop sign. It keeps the temperature or process value from swinging as widely as it would with simple on-off control. However, when the system settles down, the temperature or process value tends to "droop" short of the set point.

With proportional control the output power level equals (set point minus process value) divided by the proportional band value.

Adjust the proportional band with Proportional Pb.



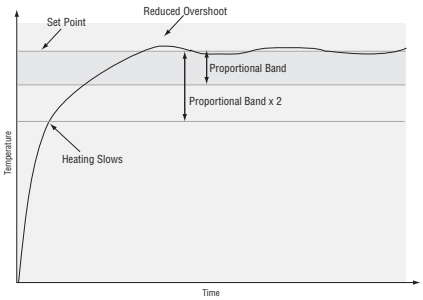
Proportional plus Integral (PI) Control

The droop caused by proportional control can be corrected by adding integral control. When the system settles down, the integral value is tuned to bring the temperature or process value closer to the set point. Integral determines the speed of the correction, but this may increase the overshoot at startup or when the set point is changed. Too much integral action will make the system unstable. Integral is cleared when the process value is outside of the proportional band.

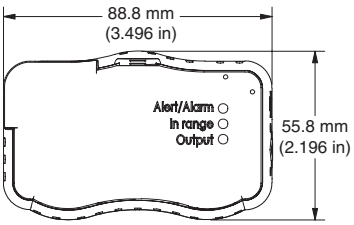
Integral Int is measured in minutes per repeat. A low integral value causes a fast integrating action.

Proportional plus Integral plus Derivative (PID) Control

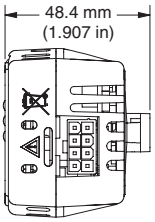
Use derivative control to minimize the overshoot in a PI-controlled system. Derivative dEu adjusts the output based on the rate of change in the temperature or process value. Too much derivative will make the system sluggish.



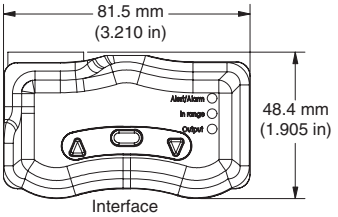
Mounting the Series EHG SL 10



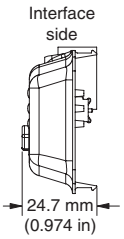
Base Controlller
front

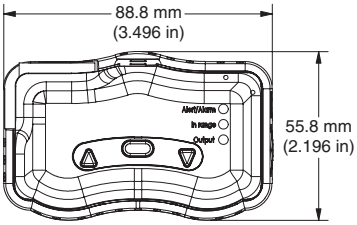


Base Controller
side

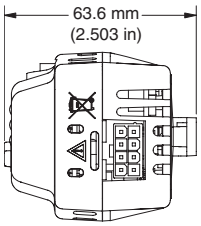


Interface
front



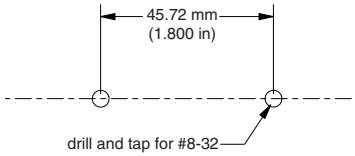


Base Controller with Interface
front

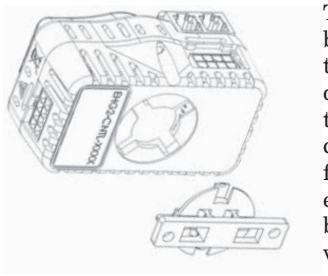


Base Controller with
Interface side

Panel mount dimensions.



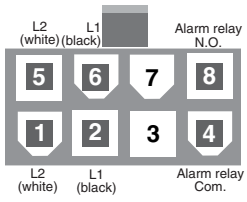
Mounting bracket



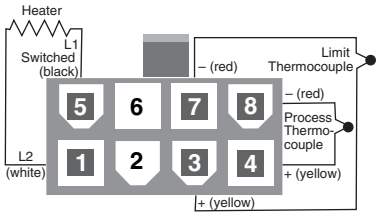
The Series EHG SL 10 mounting bracket lets you mount the controller in any of four angles. After disconnecting both wiring connectors, gently rotate the controller counterclockwise until it unlocks from the mounting bracket. Re-orient the controller on the mounting bracket and gently rotate it clockwise until it locks.

Wiring the Series EHG SL 10

View looking at the connectors.



Power and relay connectors.



Thermocouple and heater connector.

Ordering Information

Series EHG SL 10 Integrated Temperature Controller
EHG2- CNTL-_ _ _ _

0000 basic control (purchased only as part of a heater assembly)
DISP with display module
COMS with communications module
DSCM with display & communications module

Additional Cables

A002089: long cable
A002092: long terminating cable
A002162: short cable
A002163: short terminating cable

Declaration of Conformity

Series EHG SL 10
Watlow Winona, Inc.
1241 Bundy Blvd.
Winona, MN 55987 USA

CE

Declares that the following product:
Designation: **Series EHG SL 10**
Model Numbers: EHG2-CNTL-(0000, DISP, COMS, DSCM)
Classification: Electronic Thermostat with Integrated Temperature Limiter
Protective Control, Control Relay = 2C, Limit Relay = 2B, LTA Relay = 2B Installation Category II, Pollution degree 2
Rated Supply Source: 100 to 240 V~ (ac), 50 or 60 Hz
IP Code IP20
Rated Power: 5 VA Unit power, 10 A Resistive Heater Load

Meets the essential requirements of the following European Union Directives by using the relevant standards show below to indicate compliance.

89/336/EEC Electromagnetic Compatibility Directive

EN 60730-1	2001	+ A1	Automatic electrical controls for household and
EN 60730-2-9	2002		similar use – Temperature Sensing Controls, Class B Emissions
EN 61000-4-2	1996	+ A1, A2	Electrostatic Discharge Immunity
EN 61000-4-3	2002	+A1, A2	Radiated Field Immunity
EN 61000-4-4	2004		Electrical Fast-Transient / Burst Immunity
EN 61000-4-5	1995	+ A1, A2	Surge Immunity
EN 61000-4-6	1996	+ A1, A2, A3	Conducted Immunity
EN 61000-4-8	1994	+ A1	Power frequency magnetic field immunity
EN 61000-4-11	2004		Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-4-28	2000		Variation of power frequency immunity – Level 2
EN 61000-3-2	2000	ED.2	Harmonic Current Emissions
EN 61000-3-3	1995	+ A1, A2	Voltage Fluctuations and Flicker
SEMI F47	2000		Specification for Semiconductor Processing Equipment Voltage Sag Immunity – Figure R1-1

73/23/EEC Low-Voltage Directive

EN 61010-1	2001		Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements
EN 60730-1	2001	+ A1	Automatic electrical controls for household and EN 60730-2-9 2002 similar use – Temperature Sensing Controls
UL 1998 Class 1		ED.2	Software in programmable components.

Raymond D. Feller III
Name of Authorized Representative

Winona, Minnesota, USA
Place of Issue

General Manager
Title of Authorized Representative

October 28, 2005
Date of Issue

Signature of Authorized Representative

Warranty

The Series EHG SL 10 is warranted to be free of defects in material and workmanship for 24 months after delivery to the first purchaser for use, providing that the units have not been misapplied. Since Watlow has no control over their use, and sometimes misuse, we cannot guarantee against failure. Watlow's obligations hereunder, at Watlow's option, are limited to replacement, repair or refund of purchase price, and parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse or abuse.

WARNING: To avoid damage to property and equipment, and/or injury or loss of life, use National Electric Code (NEC) standard wiring practices to install and operate the Series EHG SL 10. Failure to do so could result in such damage, and/or injury or death.